REMARKS

Status of the Claims

Claims 1-3, 17, and 21-24 are now present in this application. Claims 1, 21, 17, and 24 are independent.

Reconsideration of this application in view of the following remarks is respectfully requested.

Rejections under 35 U.S.C. § 103

Claims 1, 2, 17, 21, 22 and 24 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Maeda et al. (U.S. Patent No. 6,072,910)[hereinafter "Maeda"] in view of Applicants' Admitted Prior Art [hereinafter "AAPA"]. Applicants respectfully traverse this rejection.

Applicants respectfully submit that the Examiner has failed to establish a *prima facie* case of obviousness. To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). Additionally, there must be a reason why one of ordinary skill in the art would modify the reference or combine reference teachings to obtain the invention. A patent composed of several elements is not proved obvious merely by demonstrating that each of its elements was, independently, known in the prior art. *KSR Int'l Co. v Teleflex Inc.*, 82 USPQ2d 1385 (U.S. 2007). There must be a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does. *Id.* The Supreme Court of the United States has recently held that the "teaching, suggestion, motivation test" is a valid test for obviousness, albeit one which cannot be too rigidly applied. *Id.* Rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness. *Id.*

In this instance, it is respectfully submitted that neither AAPA nor Maeda, alone or in combination, teaches or suggests all claim limitations.

For example, independent claim 1 recites, inter alia, "a **predicted reference value generator** receiving the image signal, and **generating a predicted reference value** of **each image frame from DC components** obtained by orthogonal transformation of **left-edge blocks** of the image frame . . . carries out **quantizing** and variable-length **encoding of the predicted reference value** to be added to a header, and outputs **the encoded AC components and difference values along with the encoded predicted reference value added to the header as a bit stream**." (Emphasis added.)

The Examiner acknowledges that AAPA, among other features, fails to teach or suggest the above-noted feature of independent claim 1. Thus, the Examiner imports Maeda to fulfill the above-noted deficiency of AAPA.

The Examiner relies on the process of generating "sequency components" of Maeda as disclosing the claimed process of generating "predicted reference value". Then, the Examiner relies on the conventional technique of "encoding a difference" between predicted value and the DC component found in MPEG. (*See page 3, lines 3-7 and last full paragraph of the final Office Action.*) More specifically, the Examiner now states, "Maeda is not relied upon for teaching encoding a difference, but is relied upon for teaching generating a predicted value. Using this predicted [value] with the well known technique found in MPEG of encoding a difference between the predicted value and the DC component leads to the claimed invention ..." (*See page 3, lines 3-7 of the final Office Action.*) The Examiner introduces a new reference, Awano (U.S. Pub. No. 2005/0069215), supporting his allegation that "encoding a difference" is well known (*See page 6, 2nd full paragraph of the final Office Action.*)

It is respectfully submitted that Maeda fails to fulfill the deficiency of AAPA.

The Examiner's interpretation as to "sequency components" of Maeda is improper in the light of claimed feature of the present application.

According to Maeda, the sequency components are generated by implementing an orthogonal transformation such as Hadamard transformation onto a block composed of 4x4 pixel data. (*See lines 31-37 of col. 9 and Fig. 2 of Maeda.*) The sequency components of Maeda are thus obtained through the orthogonal transformation onto a **whole block** of image instead of left-edge. (*Emphasis added.*)

Further, in Maeda, the shaded left-edge shown in Fig. 4C ***does not*** indicate a block portion on which the orthogonal transformation should be implemented, but indicates a portion where **large power** (i.e. large values) **concentrates in the sequency components Y_{ij} as a result of the orthogonal transformation onto the whole block X_{ij}** shown in Fig. 2. (*See lines 58-67 of col. 9.*) Each block is classified in one of Classes 1-4 as shown in Figs. 4A-4D according to a portion concentrating large power in Y_{ij} and then independently vector-quantized. (*See lines 6-9 of col. 10.*)

Considering the foregoing review, Maeda fails to teach "a predicted reference value" of claim 1, which is generated from DC components obtained by orthogonal transformation of left-edge blocks of the image frame, but merely teaches a sequency components Y_{ij} as a result of the Hadamard transformation onto a whole block X_{ij}.

Therefore, claim 1 is distinguished from Maeda.

Further, as submitted previously, the invention of the present application is directed to encoding a difference between a predicted reference value calculated adaptively and DC components of blocks. As mentioned in the "Background" section of the instant specification, according to MPEG-2 as an encoding type described in "MPEG", it possesses a concept of coding a difference between a predicted value and a DC component of a block. A predicted value used for this coding type is calculated from adjacent block(s), however, a predicted value of the first block in a slice unit is applied a fixed value (i.e. 'reset of the predicted value' taught in "MPEG").

On the other hand, Maeda does not possess the concept of encoding a difference between a predicted value and a DC component of a block. Maeda is directed to a conventional coding apparatus which divides digital image information into pixel blocks each having a size of mxn pixels, and subjects the image information to vector quantization in block units. More specifically, the pixel blocks are ***orthogonally transformed*** and the characteristics and sequency components of the pixel blocks are detected. Each pixel block is divided into a plurality of sub-blocks in conformity with the detected sequency components. Respective ones of the plurality of divided and outputted sub-blocks are ***scalar-quantized*** into sub-vectors of a predetermined number of bits in conformity with the characteristics of the pixel blocks. Respective ones of the scalar-quantized values of the quantized sub-blocks are ***vector-quantized*** in conformity with the

characteristics of the pixel blocks, these vector-quantized reproduction vector codes are combined and the result is subjected to further vector quantization. (*See Abstract.*)

Maeda does not teach or suggest a ***predicted reference value generator*** that generates ***a predicted reference value*** of each image frame from ***DC components*** obtained by orthogonal transformation of ***left-edge blocks*** of the image frame. Rather, as demonstrated above, Maeda discloses a coding apparatus that utilizes a correlativity of image data to perform vector quantization with a look-up table (***LUT***). The Examiner relies on col. 9, line 45 – col. 10, line 9 of Maeda as disclosing the above-identified feature of claim 1. (*See page 5, last paragraph of the Office Action.*) It is respectfully submitted that the Examiner's interpretation of the relied upon section of Maeda is totally erroneous.

The relied upon section of Maeda is directed to a conventional class sorting method in which multistage vector quantization is carried out. As mentioned earlier, in case of image data having a steep edge in the vertical direction, a large sequency component (power) concentrates in the shaded portion shown in FIG. 4B. Similarly, a large sequency component concentrates in the shaded portion shown in FIG. 4C in case of image data having a steep edge in the horizontal direction of the image data, and a large sequency component concentrates in the shaded portion shown in FIG. 4D in case of image data having a steep edge in the diagonal direction of the image data. In Maeda, an inputted image block is sorted into one of these four classes and the blocks are independently vector-quantized. (*See col. 9 line 58 – col. 10, line 9.*)

Further, Maeda discloses that in the case where the orthogonally transformed block has the vertical edge of FIG. 4B (class 2), the block is divided into bands, as shown in FIG. 5. Among these, ***a DC component is scalar-quantized independently*** and the other four bands are vector-quantized independently, thereby making it possible to achieve construction using the LUT arrangement. (*See col. 10, lines 14-20.*)

The prediction error according to "MPEG", Maeda, and the present application could be expressed as follows:

The present application:

$Dff_q = Q(DC - DC_{std})$

"**MPEG**":

$Dff_q = Q(DC - DC_{const})$ ...for the first block in a slice unit;

$Diff_q = Q(DC - DC_{pred})$ ...for blocks except the first block

Maeda:

$Diff_q = Q(DC)$

$Diff_q$: prediction error found after quantization (i.e. an object to be encoded)

Q( ) : quantization

DC : DC component

DC_{std} : predicted reference value (to be generated by using left-edge blocks)

DC_{const} : fixed value as a predicted value used for the first block in a slice unit

DC_{pred} : predicted value

A table of VLC (Variable-length Coding) for image coding is formed in a manner where a shorter bit string is allocated to a smaller value (as shown in Chart 5.18 of "MPEG"). Thus, efficiency on encoding is enhanced if a value of $Diff_q$ would be a small value. The invention of the present application intends to make a value of $Diff_q$ smaller by using DC_{std} which is adaptively generated. Thus, the claimed invention recites, *inter alia*, "***a predicted reference value*** is generated from ***DC components*** obtained by orthogonal transformation of ***left-edge blocks*** of the image frame."

The combination of AAPA and Maeda does not teach or suggest above-noted feature of the claimed invention. As demonstrated above, in Maeda, after obtaining a DC component by orthogonal transformation, such DC component is scalar-quantized. Thus, only a quantized value of the DC component will be generated which would be required to achieve construction using the LUT. A predicted reference value is ***not*** generated from the DC component.

Conversely, in the claimed invention first ***a predicted reference value*** is generated from ***DC components*** obtained by orthogonal transformation of ***left-edge blocks*** of the image frame and then the encoding apparatus carries out ***quantizing*** and variable-length encoding ***of the***

predicted reference value to be added to a header, and outputs ***the encoded AC components and difference values along with the encoded predicted reference value added to the header as a bit stream***." (*Emphasis added.*)

Thus, according to the claimed invention it is possible to provide a highly efficient image encoding when encoding the first block or a block with weak correlation with neighboring blocks.

At least in view of the above, Applicants respectfully submit that the asserted combination of AAPA and Maeda (assuming these references may be combined, which Applicants do not admit) fails to establish *prima facie* obviousness of claim 1 or any claim depending therefrom.

Independent claim 17 is directed to a decoder which recites, *inter alia*, "decoding ***a predicted reference value of each image frame generated from DC components of left-edge blocks of the image frame added to a header***." As demonstrated above in great detail, none of AAPA and Maeda teaches or suggests the above-identified feature. Thus, at least for the same reasons stated with respect to claim 1, the asserted combination of AAPA and Maeda (assuming these references may be combined, which Applicants do not admit) fails to establish *prima facie* obviousness of claim 17.

Claim 2 is distinguished from the applied prior art references at least by virtue of its dependence from claim1. Method claims 21, 22, and 24 correspond to apparatus claims 1, 2, and 17, respectively. Thus, at least for the reasons presented with respect to claims 1, 2 and 17, claims 21, 22, and 24 are also allowable over AAPA and Maeda.

Accordingly, it is respectfully requested to withdraw the rejection of claims 1, 2,17, 21, 22, and 24 based on AAPA and Maeda.

Claims 3 and 23 are rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over Maeda in view of AAPA and further in view of Pesquet-Popescu (U.S. Patent No. 6,519,284)[hereinafter "Popescu "]. These rejections are respectfully traversed.

Claim 3 depends from claim 1 and claim 23 depends from claim 21. As demonstrated above in great detail, the combination of AAPA and Maeda fails to teach or suggest, *inter alia*, "a ***predicted reference value generator*** receiving the image signal, and ***generating a predicted reference value*** of ***each image frame from DC components*** obtained by orthogonal transformation of ***left-edge blocks*** of the image frame . . . carries out ***quantizing*** and variable-length encoding ***of the predicted reference value*** to be added to a header, and outputs ***the encoded AC components and difference values along with the encoded predicted reference value added to the header as a bit stream***" as recited in claim 1 (or corresponding claim 21). Popescu has not been, and indeed cannot be, relied upon to fulfill the above-noted deficiency of AAPA and Maeda. Thus, at least for this reason, it is respectfully requested to withdraw the rejection of claims 3 and 23, based on AAPA, Maeda, and Popescu.

Conclusion

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance.

Should there by an outstanding matters that need to be resolved in the present application, the Examiner is respectfully requested to contact Ali M. Imam, Registration No. 58,755 at the telephone number of the undersigned below to conduct an interview in an effort to expedite prosecution in connection with the present application.

If necessary, the Director is hereby authorized in this, concurrent, and future replies to charge any fees required during the pendency of the above-identified application or credit any overpayment to Deposit Account No. 02-2448.

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Respectfully submitted,

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